T.C.
MİLLÎ EĞİTİM BAKANLIĞI

MOTORLU ARAÇLAR TEKNOLOJİSİ

ARAÇ TEKNİK YABANCI DİLİ (İNGİLİZCE)

222YDK128

Ankara, 2011

- Bu modül, mesleki ve teknik eğitim okul/kurumlarında uygulanan Çerçeve Öğretim Programlarında yer alan yeterlikleri kazandırmaya yönelik olarak öğrencilere rehberlik etmek amacıyla hazırlanmış bireysel öğrenme materyalidir.
- Millî Eğitim Bakanlığınca ücretsiz olarak verilmiştir.
- PARA İLE SATILMAZ.

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AÇIKLAMALAR

KOD	**222YDK128**
ALAN	**Motorlu Taşıtlar Teknolojisi**
DAL/MESLEK	**Tüm Dallar**
MODÜLÜN ADI	**Araç Teknik Yabancı Dili (İngilizce)**
MODÜLÜN TANIMI	Otomotiv teknolojisi alanında kullanılan İngilizce teknik terimler, kavramlar ve yayınların tekniğine uygun olarak okunabilmesini sağlayan eğitim materyalidir.
SÜRE	40/32
ÖN KOŞUL	Bu modülün ön koşulu yoktur.
YETERLİK	Yabancı dilde mesleki konuları dinlemek, konuşmak, okumak ve yazmak
MODÜLÜN AMACI	**Genel Amaç** Otomotiv gövde ve boya teknolojisi ile ilgili teknik İngilizceyi okuma, anlama, yazma ve konuşma düzeyinde öğrenebileceksiniz. **Amaçlar** **1.** Otomotiv panel ile ilgili Teknik İngilizce' yi kullanabileceksiniz. **2.** Otomotiv gövde ile ilgili Teknik İngilizce' yi kullanabileceksiniz. **3.** Otomotiv gövde yardımcı donanımları ile ilgili Teknik İngilizce' yi kullanabileceksiniz. **4.** Otomotiv boya yüzey hazırlama ile ilgili Teknik İngilizce' yi kullanabileceksiniz. **5.** Otomotiv boya yüzey dolgu ve diğer konuları ile ilgili Teknik İngilizce' yi kullanabileceksiniz.
EĞİTİM ÖĞRETİM ORTAMLARI VE DONANIMLARI	**Ortam:** Derslikler, internet ortamı, işletmeler ve araştırmaya yönelik etkinlikler yapılabilecek tüm ortamlar. **Donanım:** Sınıf ortamındaki araç gereçlerin yanı sıra projeksiyon cihazı ve bilgisayarlar.
ÖLÇME VE DEĞERLENDİRME	Modül içinde yer alan her öğrenme faaliyetinden sonra verilen ölçme araçları ile kendinizi değerlendireceksiniz. Öğretmen modül sonunda ölçme aracı (çoktan seçmeli test, doğru-yanlış testi, boşluk doldurma vb.) kullanarak modül uygulamaları ile kazandığınız bilgi ve becerileri ölçerek sizi değerlendirecektir.

INTRODUCTION

Dear student;

The automotive industry and automotive sectors grow and develop rapidly with each passing day. We have to follow these developments in the foreign companies' web sites and published articles. For this reason, we must have knowledge the technical of English. Our advice to you, at least in your own must be grasped of technical English. If we want to achieve the level of advanced civilizations, we should follow their present technologies and must generate new technologies.

If you complete this module successfully, you will be at the same level with European colleagues and will be able to compete. Do not forget that; the car was imagined at one time, the point at the moment cannot be imagined, but the truth. However, the developed countries are the biggest source of income. In this sector, your contributions and efforts will continue moving. We hope to get your own car produce the project of Turkey. I wish all of you will succeed in your education and your business life

LEARNING ACTIVITY-1

AIM

You will use the technical English about automotive panel.

SEARCH

- Examine the company catalogs in English prepared and research the subject in detail on the internet.

1. AUTOMOTIVE PANEL

1.1. Doors

Doors are the first parts of automotive panel. There are two or four doors on the automotive body. There are two doors in front of the car and two doors behind of the car. If the car has only two doors, they are in front of the car. They are made of sheet iron and may be unstitched. The doors are used for getting in and out the car by people. You can see a car and its doors in the picture 1.1.

Picture 1.1: Car and its doors

Picture 1.2: Front door

1.2. Engine bonnet (hood)

The bonnet is the second part of automotive panel. It is made of sheet iron and it covers the engine unit. There is only one engine bonnet and baggage bonnet on the automotive body. Look at the picture 1.3 to see the engine bonnet on the car.

Picture 1.3: Engine bonnet and door

1.3. Baggage bonnet (trunk lid)

The baggage bonnet is made of sheet iron. It is located behind of the car and covers the baggage unit. Engine and baggage bonnet may shell out parts of automotive. You can see the baggage bonnet in picture 1.4.

Picture 1.4: Baggage bonnet

APPLICATION ACTIVITY

Use technical English about the panel on automotive

Steps of process	Suggestions
➢ Find a text about this process and translate it. ➢ Translate the text given below.	➢ Please read all of the text. ➢ If you do not know words in text, research the meaning during translation ➢ Use English dictionary for the meaning of words from English to Turkish ➢ You can find detailed information about the technical words in the text. ➢ Make research about automotive panel.

There are two general types of doors: closed style (with upper frames) and hardtop or convertible style (without upper frames). Doors contain a variety of devices, including window regulators, locks, cigarette lighters, windshield-wiper controls, seat-adjustment controls, rearview mirror and control, and door reinforcing strips. Window regulators can be mechanical, with a hand crank, or electric, with a reversible electric motor. Door locks can be mechanical, with a hand-operated button, or electric, with a two-way solenoid. Cigarette lighters and ashtrays are used in many doors. On some cars, the windshield-wiper control is located in the front left-hand door, as being the rearview mirror and its remote control. This location permits the driver to operate the controls as necessary.

The front hood is attached to the body by two hinges, usually spring-loaded. The springs make it easier to open the hood and it opens. Elongated or oversize holes permit the hood to be shifted as necessary to secure a good fit. In some cars the hood lock is at the front of the car. In others, the hood lock is connected by a cable to a control lever inside the passenger compartment.

CHECKLIST

If you have behaviors listed below, evaluate yourself putting (X) in yes box for your earned skills within the scope of this activity otherwise put (X) in no box

Evaluation Criteria	Yes	No
1. Have you ever had the knowledge of technical English about the doors of the car?		
2. Have you ever had the knowledge of technical English about the bonnet of the car?		
3. Did you make research on the subject?		

EVALUATION

Please review your "No" answers in the form at the end of the evaluation. If you do not find enough yourself, repeat the learning activity. If you give all your answers "Yes" to all questions, pass to the "Measuring and Evaluation".

MEASURING AND EVALUATION

Read the sentences and answer the questions. Then compare your answers with the answer key at the end of the module.

1. What is the automotive door made of?

A) It's made of plastic material
B) It's made of steel material
C) it's made of sheet iron material
D) it's made of wood material

2. Which one may be used to pull out parts on the automotive body?

A) The ceiling
B) The doors
C) The engine unit
D) The bottom

3. Which one may not be used to pull out parts on the automotive body?

A) The door
B) The glass
C) The engine bonnet
D) The ceiling

➢ **After reading each sentence, put T (true) or F (false) in the blank.**

4. ( ) The baggage bonnet is made of sheet iron.

5. ( ) There are three or six doors on the automotive body.

6. ( ) The doors aren't used for getting in and out the car by people.

EVALUATION

Please compare the answers with the answer key. If you have wrong answers, you need to review the Learning Activity. If you give right answers to all questions, pass to the next learning activity.

LEARNING ACTIVITY-2

AIM

You will use the technical English about automotive body.

SEARCH

- Examine the company catalogs in English prepared and research the subject in detail on the internet.

2. AUTOMOTIVE BODY

2.1. Automotive Ceiling

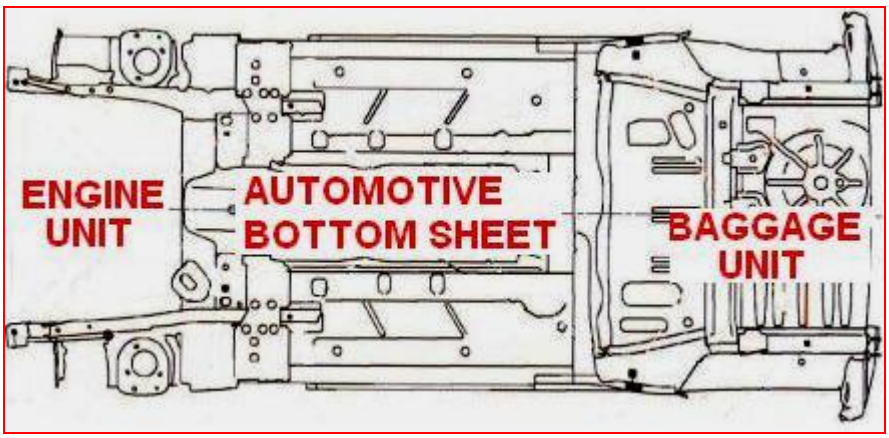
The automotive ceiling is the first part of automotive body. It is made of sheet iron and it covers the automotive top. The ceiling can be opened completely or partly for some automobiles. The ceiling which can be opened completely is called cabriolet. The ceiling may not shell out because it is welded on the body. Look at the picture 2.1 to see the ceiling.

Picture 2.1: Automotive ceiling

2.2. Automotive Bottom

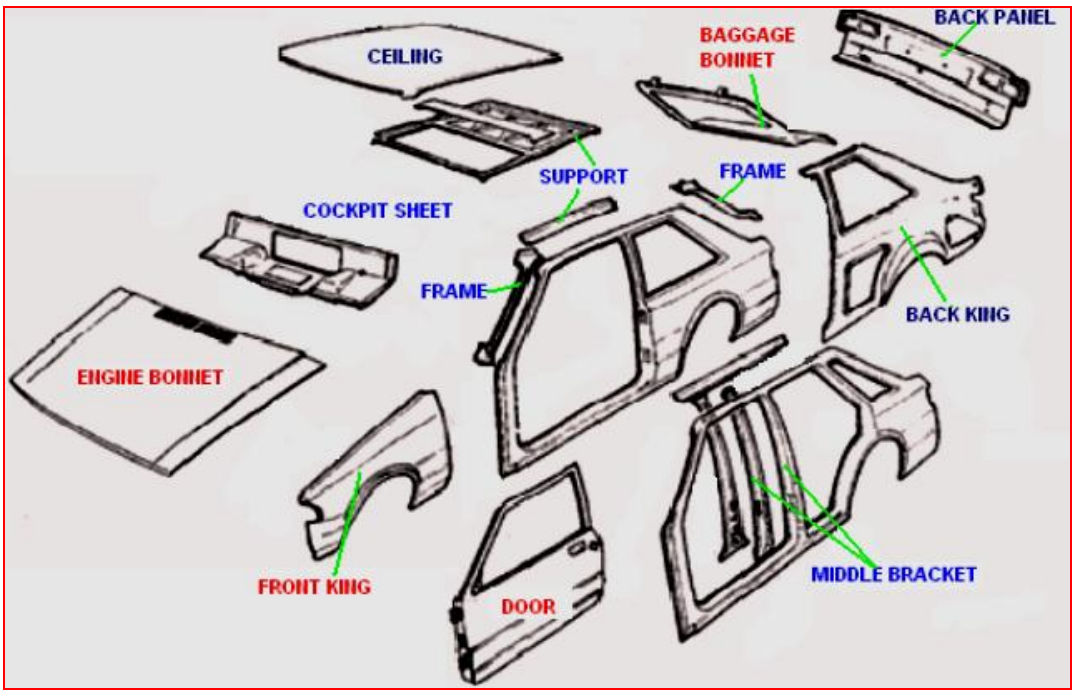
The automotive bottom is the second part of automotive body. The bottom carries passengers and the other parts of automobile. It is made of steel sheet iron. Both sides of its

surfaces are coated with pitch in order to get endurance against rust. Look at the picture 2.2 to see the bottom sheet iron.



Picture 2.2: Automotive bottom

Look at the picture 2.3 to see the all parts of the panel.

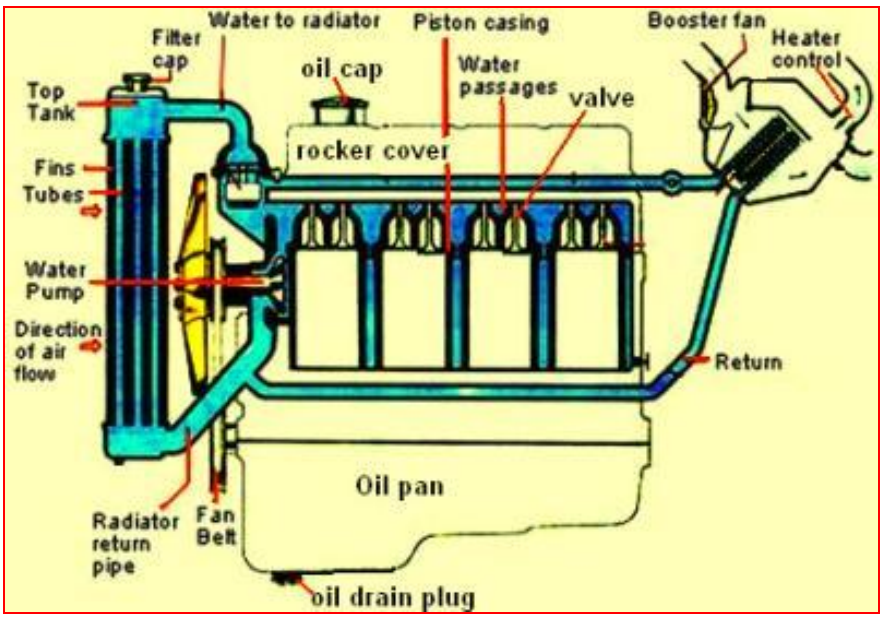


Picture 2.3: Body parts

2.3. Automotive Baggage And Engine Unit

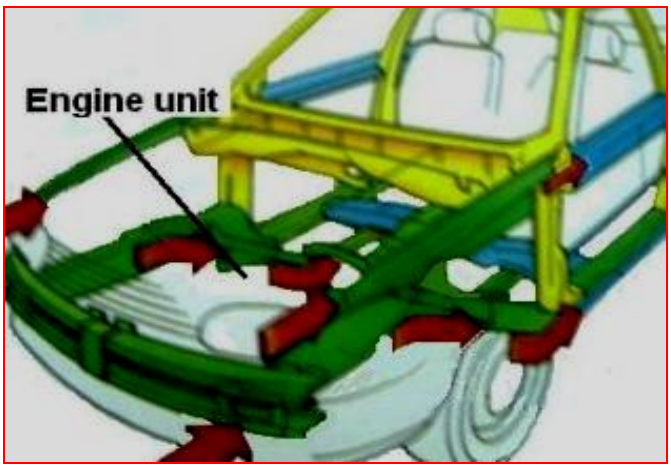
2.3.1. Engine And Engine Unit

All motor vehicles have engines. Three engine types are generally used. These are petrol engines, liquid petrol gas engines and diesel engines. There are spark plugs in all petrol engines but diesel engines don't have spark plugs. They have fuel injectors. There are valves in the four stroke engines. There are no valves in the two stroke engines. Two stroke engines are used in the motorcycles. The four stroke engines have oil sump but there aren't two stroke engines. The oil is mixing with fuel before using two stroke engines. Generally; the all automotive engines have water cooled systems and radiator. Look at the picture 2.4 to see the automotive engine and water cooling system.



Picture 2.4: Automotive engine and water cooling system

Automotive baggage and engine unit are combined to the bottom of the car. The engine unit is carrying engine and other companion. Look at the picture 2.5 to see the automotive engine unit.



Picture 2.5: Automotive engine unit

These highly durable new materials replace 50% of the waste cotton in phenolic felt by glass fiber. The process which is used combines current air lay technology to thermo compression.

Benefits;

- Improved mechanical behaviour,
- Fire resistance,
- Acoustic performance,

Look at the picture to see the isolation component of the engine unit.

Picture 2.6: Engine unit isolation component

2.3.2. Baggage Unit

A baggage unit carries spare wheel, jack, fuel depot and luggage. This compartment offers multi-level storage in station wagons, SUVs and off-road vehicles. It has a double-wall load floor with an integrated hinge and a set of handle hooks for attaching shopping bags. You can see the baggage bonnet in picture 2.7.

Picture 2.7: Baggage bonnet

Benefits;

- Parcel shelf and trunk partitioning,
- Higher load volume for closed trunk,
- Parcel shelf can be moved to back seat,
- 100% washable.

Look at the picture 2.8 to see the baggage unit isolation and floor (upholstery).

Picture 2.8: Baggage unit isolation and floor

Look at the picture 2.9 to see the liquid gasket, silicone and adhesive cement for protect the body from the corrosion.

Picture 2.9: Silicone, adhesive cement and gun

APPLICATION ACTIVITY

Use technical English about automotive body.

Steps of process	Suggestions
Find a text about this process and translate. Translate the text given below	➢ Please read all of the text. ➢ If you do not know words in text, research the meaning during translation ➢ Use English dictionary for the meaning of words from English to Turkish ➢ You can find detailed information about the technical words in the text. ➢ Make research about automotive body.

Usually, two or three or more of the methods are used to repair a single panel. For example, you might use a spread ram to push out a fender. Then you would use one of the pull methods to pull out a buckle. During this procedure you might use the hammer to relieve the stresses in the metal. Finally, you would sand and fill the damage area with plastic body filler.

There are several different methods of pulling on sheet-metal panels. The purpose is to pull out buckles and creases to restore, as nearly as possible, the original contour of the panel. In the past, with the low-carbon, soft sheet steel, it was relatively easy to pull out panels that were not too badly damaged. However, with the newer HSLA panels, it is more difficult to pull out damages. The pull must be distributed over a larger area. And the pulling force must be applied more gradually so the metal does not tear. Pulls and pushes may be required to straighten body panels and to reestablish proper alignment of the body itself.

Vacuum cups can be used to correct oil-can damage to sheet metal. If the paint has not been damaged and if the metal has not been bent beyond its elastic limit, the depression often may be pulled out without damaging the paint. Under ideal conditions, this would be the repair job that would take only a few minutes. However, if there is paint damage to the metal (metal bent beyond elastic limit), then the pull-out is only the first in the repair job.

To use a vacuum cup, first make sure that the body panel is clean. All dirt should be washed off so the paint will not be scratched when the vacuum cup is used. Wet the cup and press it in against the panel, at the center of the depression. When the air has been squeezed out of the cup, it will grip the metal. Pull out steadily to bring the metal out to its original contour.

For working on larger areas, such as a damaged roof, vacuum-cup assemblies with three cups are available. They are attached to a plate which has a handle that can be pulled out by hand or by a crane. The technician is using a body spoon and hammer to work out a ridge while the pull is being made.

CHECKLIST

If you have behaviors listed below, evaluate yourself putting (X) in yes box for your earned skills within the scope of this activity otherwise put (X) in no box

Evaluation Criteria	Yes	No
1. Have you ever had the knowledge of the technical English with elements of the car ceiling?		
2. Have you ever had the knowledge of the technical English with elements of the car bottom?		
3. Have you ever had the knowledge of the technical English with elements of the car baggage and engine unit?		
4. Did you make research on the subject?		

EVALUATION

Please review your "No" answers in the form at the end of evaluation. If you do not find enough yourself, repeat the learning activity. If you give all your answers "Yes" to all questions, pass to the "Measuring and Evaluation".

MEASURING AND EVALUATION

Read the sentences and answer the questions. Then compare your answers with the answer key at the end of the module.

1. What is the automotive ceiling made of?

A) it's made of plastic material
B) it's made of steel material
C) it's made of wood material
D) it's made of sheet iron material

2. Which one is more important than the other parts of the automotive?

A) The door
B) The glass
C) The engine
D) The ceiling

3. How many ceilings are there on the automotive?

A) There is one
B) There are four
C) There are two
D) There are three

After reading each sentence, put T (true) or F (false) in the blank.

4. ( ) The ceiling covers the engine unit.

5. ( ) The isolation component has got acoustic performance

6. ( ) The windows aren't used for ventilation interior of the car.

EVALUATION

Please compare the answers with the answer key. If you have wrong answers, you need to review the Learning Activity. If you give right answers to all questions, pass to the next learning activity

LEARNING ACTIVITY-3

AIM

You will use the technical English about automotive body auxiliary systems.

SEARCH

- Examine the company catalogs in English prepared and research the subject in detail on the internet.

3. AUTOMOTIVE BODY AUXILIARY SYSTEMS

3.1. Automotive Glass Systems

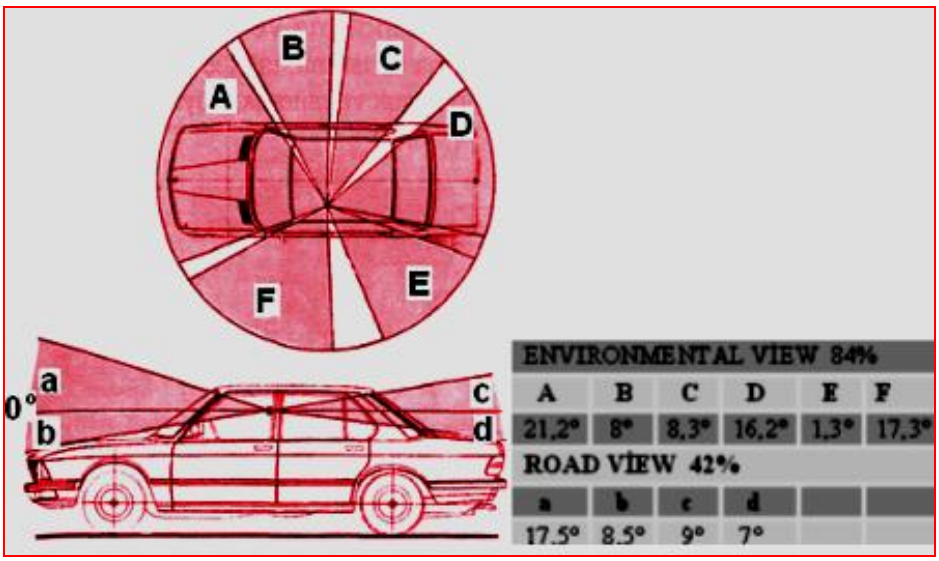
Automotive glasses provide seeing outside while people are in the car. Front and back glasses are fixed. Side glasses can open for ventilating inside of the car. The glasses must be strong for an accident. If the glasses have poor quality, they may cause death of the passenger. Automotive glasses are presented in four kinds according to their position on the cars. These are;

- Front glass (windscreen)
- Back glass (back window)
- Side glasses (left and right side windows)

Look at the picture 3.1 to see the automotive glasses.

Picture 3.1: Glasses on the car

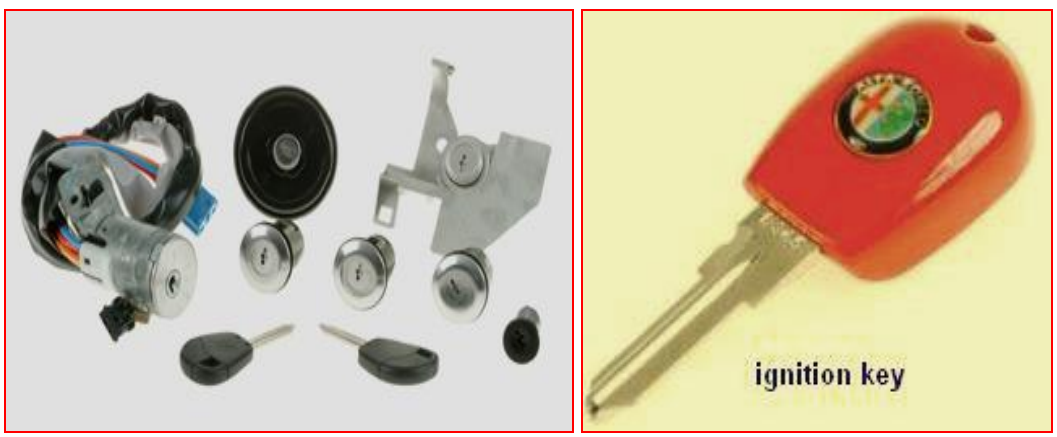
The glasses must be designed like picture 3.2 for a good view on the automotive.



Picture 3.2: View angle on the car

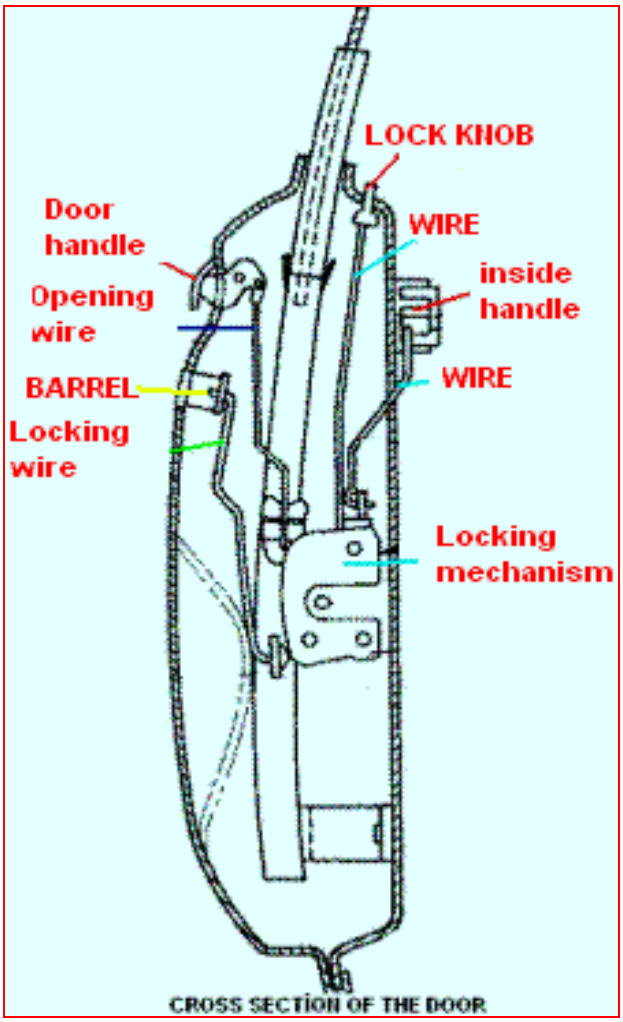
3.2. Automotive Door Lock Systems

Automotive door lock systems can turn on and turn off the doors. So we can lock and open the doors and baggage when we want. The locks have to get safety. However the drivers can open the entire door by the automatic door lock system. Look at the picture 3.3 to see the door lock systems and keys.



Picture 3.3: Door lock systems and keys

You can see the locking mechanism on the cross-section door in picture 3.4.



Picture 3.4: Cross-section of the door

3.3. Automotive Seat And Seat Frame Systems

The firms are also developing seat frames that can absorb severe impacts. All new products are tested in the Seating test canters, equipped with powerful simulation, calculation and virtual development tools. For example, it is an active anti-submarining mechanism which prevents the occupant from sliding under the seatbelt in the event of impact. Vehicles are subjected to virtual crashes in order to test airbag deployment and the resistance of seats to the impact of luggage in the rear of the vehicle. Slim line seats help to optimize the vehicle's interior space. Look at the picture 3.5 to see the different automotive new slim line, front driver and passenger seats.

Picture 3.5: Automotive front seats

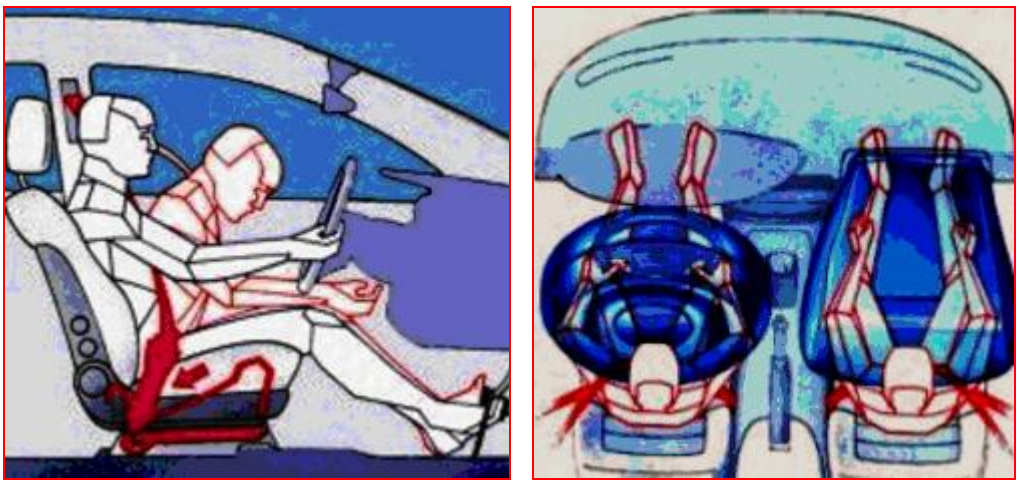
3.3.1. Head Support

Head support mechanism supports human neck. Sometimes head support is safe for passenger's life when the car crashes. It is important as safety belt. Look at the picture 3.6 to see the head support and mechanism.

Picture 3.6: Head support mechanism

3.3.2. Safety Belts And Air-Bags

Safety belts and air-bags are very important for passenger safety. These components protect passenger's life while big accident. You can see safety belts and air-bags while crash in picture 3.7.



Picture 3.7: Safety belts and air-bags

3.3.3. Design Of Automotive Interior

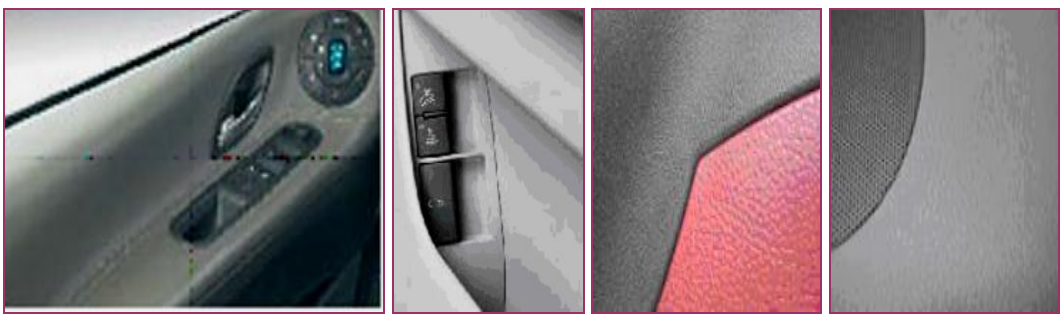
Picture 3.8: Automotive back seats

You can see the back seats in the car in picture 3.8. The door is unique in that it is part of both the interior and exterior of the vehicle, and must meet a wide variety of end-user needs. Door design and manufacture must take into account integration into the bodywork and respect the vehicle's visual, safety and ergonomic imperatives. Like the other parts of the cabin, the door must also meet the automaker's specifications in terms of perceived quality and weight, in addition to sealing tightly when shut. In door structures, innovation is focused on generalizing the use of composite plastics, which allow for greater precision and flexibility in production than metals and the development of extremely competitive solutions in terms of technical performance, weight. For its door panel and door module structures, firms use a full range of synthetic and natural materials, including thermoplastics, highly-engineered thermoplastic composites, metal-plastic hybrids, fiber-reinforced polyurethanes and wood natural fiber composites. For the surfaces, textile, foil, skin and leather are processed using technologies such as thermoforming, slush, back-foaming and

overmoulding, and different materials are often combined to harmonious effect. The door plays a crucial role in protecting occupants in the event of a frontal and side impact. Look at the picture 3.9 and 3.10 to see the design of car's interior.

Picture 3.9: Design of car's interior (upholstery)

Central to the structure and animation of the car interior, cockpit modules combine design with functionality.



Picture 3.10: Use material for design of car's interior

This high class polyurethane skin for instrument panels or door panels has set a new standard in terms of perceived quality and design features. After painting in the open and grained mould, liquid polyurethane is injected in order to obtain a constant thickness in the finished skin.

Benefits;

- High-quality surface: grain, soft touch, low gloss
- Sharp radii and colour variability in line with new design trends
- Environmentally friendly material
- Constant thickness
- Properties highly suitable for airbag deployment

The latest generation of polyurethane foam offers enhanced load-bearing capacity and resilience, thanks to a new molecular structure.

Benefits;

- This high-performance foam offers the human body better support and contact comfort.
- The material offers improved durability and damping properties compared to conventional foam.
- The foam can be used in thin layers to produce slimmer seats with the same level of comfort as standard seats.

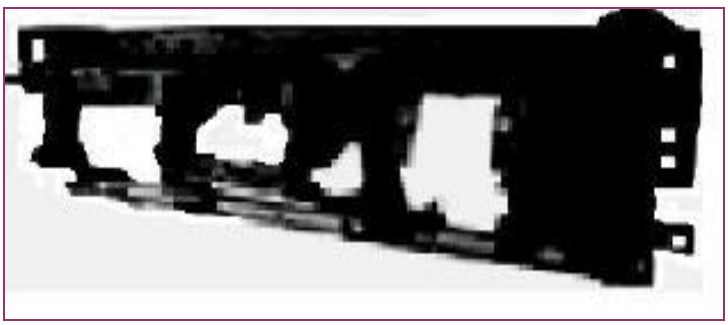
Picture 3.11: Foam

This metal-plastic hybrid cockpit structure integrates the structural and air-distribution functions in a single part. It was designed for a world platform and can be fitted with different styling for different brands.

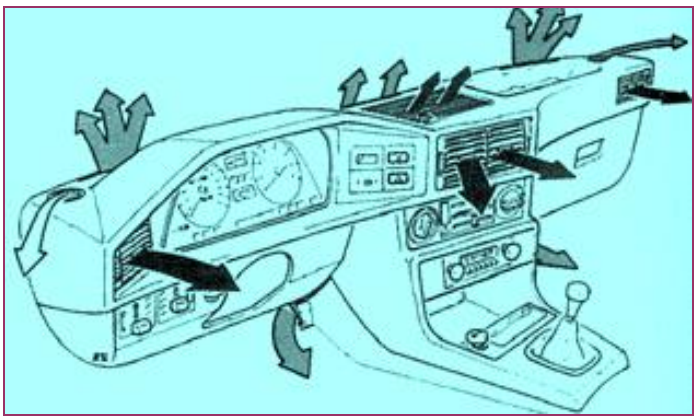
Benefits;

- Weight reduction,
- Comfort improvement by reducing vibrations,
- Best-in-crash safety performance,
- Standardized "hidden" part fitted with brand dedicated instrument panels.

Look at the picture 3.12 and 3.13 to see the automotive cockpit.



Picture 3.12: Automotive cockpit

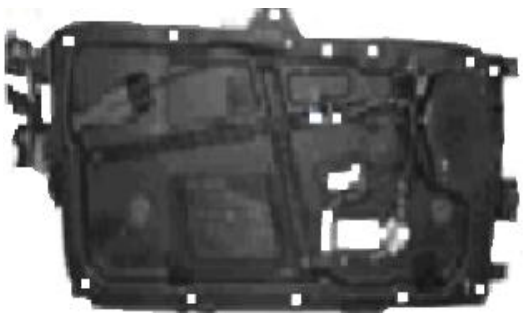


Picture 3.13: Automotive cockpit and gauges

The high integrated module; integrates all the main functions of a door - window-lifter, electric/electronic components, loudspeaker, latch system - on a sealed plastic carrier.

Benefits;

- The plastic carrier enables a high level of integration, with parts such as window-lift rails, motor housing, energy absorption pads, fixings and sealing directly integrated,
- A complete, pre-tested module is delivered to the automaker, which therefore enjoys enhanced quality, improved logistics and reduced weight and cost.
- In addition, the end-user benefits through fuel savings, better acoustic behaviour and higher performance.



Picture 3.14: Door's interior component

This high class polyurethane skin for instrument panels or door panels has set a new standard in terms of perceived quality and design features. After painting in the open and grained mould, liquid polyurethane is injected in order to obtain a constant thickness in the finished skin.

Benefits;

- High-quality surface: grain, soft touch, low gloss
- Sharp radii and colour variability in line with new design trends
- Environmentally friendly material
- Constant thickness and properties highly suitable for airbag deployment.

APPLICATION ACTIVITY

Use technical English about automotive body auxiliary systems.

Steps of process	Suggestions
Find a text about this process and translate. Translate the text given below	➢ Please read all of the text. ➢ If you do not know words in text, research the meaning during translation ➢ Use English dictionary for the meaning of words from English to Turkish ➢ You can find detailed information about the technical words in the text. ➢ Make research about automotive body auxiliary systems.

There are two basic types of automotive glass: the laminated safety glass, used for the windshield, and solid tempered plate glass, used for side and back glass. The laminated safety glass consists of a layer of plastic material sandwiched between two layers of glass. The plastic material greatly reduces the possibility that the glass will shatter. If the glass does break, the plastic prevents the broken pieces from flying off. Tempered glass is less brittle than ordinary plate glass. When tempered is broken, it tends to crumble into very small pieces. There are no large pieces with sharp edges from the break that could cause injury to passengers.

The various mechanisms in doors may require service. These include the window regulators that raise and lower the glass, the latching mechanism that holds the door closed but allows it to be opened when operated, and locking device. When the door handle is operated, either from the inside or outside, a rod is moved. This causes the latch to release so the door can be opened. Then, when the door is closed, the latch operates to hold it closed.

Various kinds of seat are used in cars. Front seats have an arrangement which permits them to be moved forward or backward. This adjustment is made manually on same seats, by operating a release handle. On others, the adjustment is made electrically, by means of an electric motor. Electrically operated seats can also be raised or lowered. Four-way seats can be moved back and forth and up and down. Six-way seats have an additional control that changes the tilt of the seat.

CHECKLIST

If you have behaviors listed below, evaluate yourself putting (X) in yes box for your earned skills within the scope of this activity otherwise put (X) in no box

Evaluation Criteria	Yes	No
1. Have you ever had the knowledge of the technical English with upholstery systems in car?		
2. Have you ever had the knowledge of the technical English with door lock systems in car?		
3. Have you ever had the knowledge of the technical English with glass systems in car?		
4. Did you make research on the subject?		

EVALUATION

Please review your "No" answers in the form at the end of evaluation. If you do not find enough yourself, repeat the learning activity. If you give all your answers "Yes" to all questions, pass to the "Measuring and Evaluation".

MEASURING AND EVALUATION

Read the sentences and answer the questions. Then compare your answers with the answer key at the end of the module.

1. What is the automotive cockpit made of?
- **A)** It is made of wood material
- **B)** It is made of plastic material
- **C)** It is made of metal-plastic hybrid material
- **D)** It is made of fiberglass material

2. Which one has got a special acoustic isolation component?
- **A)** The ceiling
- **B)** The door
- **C)** The cockpit
- **D)** All

3. Which one is more important than the other parts of the automotive?
- **A)** The door
- **B)** The safety belt
- **C)** The seat
- **D)** The glass

After reading each sentence, put T (true) or F (false) in the blank.

4. ( ) The head support is made of sheet iron.

5. ( ) The cockpit modules combine design with functionality.

6. ( ) All new seats are tested in the seating test centers.

EVALUATION

Please compare the answers with the answer key. If you have wrong answers, you need to review the Learning Activity. If you give right answers to all questions, pass to the next learning activity

LEARNING ACTIVITY-4

AIM

You will use the technical English about automotive paint surface preparations.

SEARCH

- Examine the company catalogs in English prepared and research the subject in detail on the internet.

4. AUTOMOTIVE PAINT SURFACE PREPARATIONS

4.1. Metal Surface Preparation

To prepare for polyester body filler the feather edges of both the old paint and the black primer from the new panel must be sanded. This can be done manually or with an orbital sanding machine. A high quality refinishing job, for example on a virtually new car, must result in a very good finish quality, which means that comprehensive body filling and priming work with careful fine sanding will be required. Look at the picture 4.1 to see the metal surface preparing.

Picture 4.1: Metal surface preparing

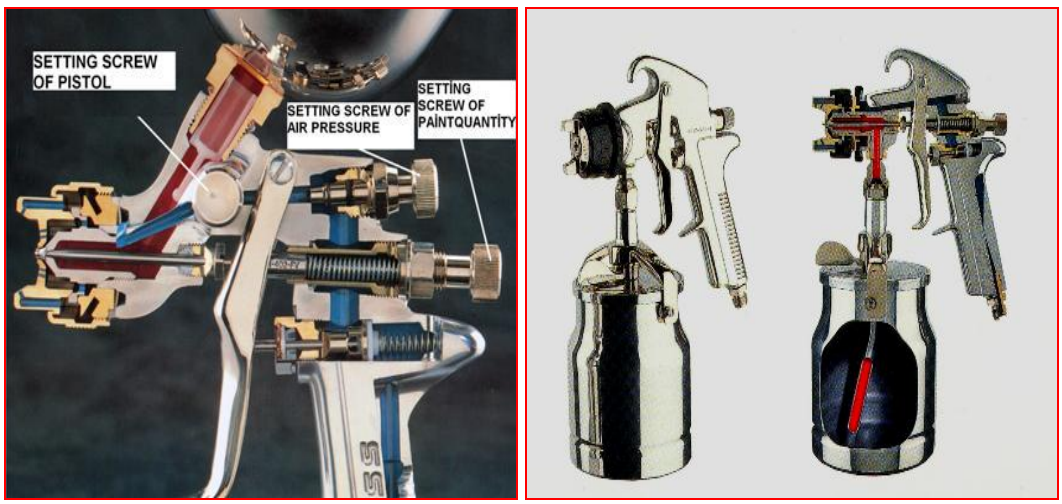
The appearance of a finish depends not only on the paint materials and how they are processed but also on the condition of the spraying and drying booths and that of the other equipment. Paints should be applied at an ambient temperature of between 18 °C and 25 °C. The air used for spraying must be free oil and water. The spraying pressure must be constant. The choice of the correct nozzle and the cleanliness of both the nozzles and the air caps are

also important since there will not be an even spraying pattern otherwise. Look at the picture 4.2 to see the sanding paper and waxy paper which are used for cleaning the surface.

Picture 4.2: Sanding paper and waxy gland

4.1.1. The Air

The air drawn in from outside must be filtered and warmed. This applies particularly in the colder seasons and especially in the case of combi-booths, i.e. spray booths that also serve as drying booths. The amount of air to be drawn in depends on the size of the spray booth and is also directly related to the amount of air extracted. In all cases, however, enough air must be drawn in for the pressure in the spray booth to be higher than the pressure outside. The filters used must of course be adapted to this purpose and kept clean at all the time. The air speed should not be too high either since the paint applied would then dry too quickly on the surface. The result would be poor flow and also the formation of specks due to insufficient overspray absorption. Furthermore, if the surface dries too rapidly, this can lead to loss of gloss and wrinkling. The paint spray is doing with paint pistol. Look at the picture 4.3 to see the paint spraying pistol.



Picture 4.3: Paint spraying pistol cross-section

The paint firms offer comprehensive range of products for the repair trade which allows body shops to select the ideal refinishing process by choosing fast or slow hardeners,

thinners and additives. Only by the selection of and specialization in certain materials and procedures can efficient and economic paint jobs be achieved. What is the most important for a good result is to stick to the recommended application data in respect of mixing ratios, film thickness, viscosity and drying time etc.?

4.1.2. Paint Spraying

Spraying and drying booths are kept free of dust mainly by means of an efficiently functioning ventilation system, which is also necessary for safety reasons. In order to avoid build-ups of explosive mixtures of solvent vapour and air. The result of repair job depends not only on the spraying technique, but also to a great extent on a proper ventilation system. The volume of air needed in a spray booth is approx (20,000 m^3). The air used for spraying should not be drawn from the workshop because this would require a higher level of dust filtering. Look at the picture 4.4 to see the paint spraying process.

Picture 4.4: Paint spraying process

4.2. Plastic Surface Preparing

Multi-purpose system is suitable for all paintable plastic materials on cars. Pure polypropylene (pp) and polyethylene (pe) can't be painted. In order to guarantee paintability, modified plastic materials are used for vehicle parts that shall be painted. Although these plastic parts are often labeled (pp), nevertheless the materials are paintable. In plastics refinishing, the paint materials to be used must be specially adjusted to the properties, for example the elasticity of the plastics to be refinished. The recommended refinishing processes are detailed in paint firm's technical manual. Especially, plastic thinner must be used for cleaning the plastic surface. Filling paste must be practiced on the surface after the cleaning. The surface is sanding at the moment. The adhesion primer is spraying when the surface is dry. Last of all; the paint is spray and should be waited for drying.

APPLICATION ACTIVITY

Use technical English about automotive paint surface preparations.

Steps of process	Suggestions
Find a text about this process and translate. Translate the text given below	➢ Please read all of the text. ➢ If you do not know words in text, research the meaning during translation ➢ Use English dictionary for the meaning of words from English to Turkish ➢ You can find detailed information about the technical words in the text. ➢ Make research about automotive paint surface preparations

The surface requiring painting must be properly prepared so that it will take undercoats and topcoats. Unless the surface is properly prepared, the paint job will be a failure. The auto paint shop handles vehicles that have been repaired in the body shop and also vehicles that need only paint work. Some paint jobs involve painting a panel or spot-painting only part of a panel. Other vehicles require complete repainting. In addition to handling on-vehicle paint jobs, the paint technicians may also paint detached parts. For example, a new fender might be painted before it is installed on a car. Or a detached door might have a new skin installed. It might be more convenient for the new panel to be painted before the door is reinstalled on the car.

Before surface preparation for painting can begin, any metal damage must be straightened and filled. Then you are ready to prepare the surface for painting. Several steps are required. The actual procedure varies with the kind of paint repair job, and also with the type of paint already on the vehicle. The steps in surface preparation are listed below. Each step is described in detail in following sections.

1. Blow the dust off, including the dust between joints.
2. Wash the car. Dry it completely.
3. Clean the area to be repaired, using a wax-and-silicone remover to all traces of wax, tar, and polish.
4. Examine the type of damage and the condition of the paint. On some jobs, you will grind off the paint and featheredge out to good paint surrounding the damage. On other job, you will remove all the paint from the panel and paint the complete panel instead of making a spot paint repair. A third procedure would be to treat the old paint as necessary, and then spray the new paint over it. These alternatives are described later.
5. Reclean the area to be repainted with wax-and-silicone remover.
6. Clean the metal with a metal conditioner. This dissolves any rust or corrosion, and also slightly etches the metal.
7. Apply a suitable metal treatment, or conversion coating, to the surface to help prevent rust and provide maximum adhesion of primer.

CHECKLIST

If you have behaviors listed below, evaluate yourself putting (X) in yes box for your earned skills within the scope of this activity otherwise put (X) in no box

Evaluation Criteria	Yes	No
1. Have you ever had the knowledge of the technical English with metal paint surface preparation on car?		
2. Have you ever had the knowledge of the technical English with plastic paint surface preparation on car?		
3. Have you ever had the knowledge of the technical English about car paint applications?		
4. Did you make research on the subject?		

EVALUATION

Please review your "No" answers in the form at the end of evaluation. If you do not find enough yourself, repeat the learning activity. If you give all your answers "Yes" to all questions, pass to the "Measuring and Evaluation".

MEASURING AND EVALUATION

Read the sentences and answer the questions. Then compare your answers with the answer key at the end of the module.

1. What are you doing first for preparing the metal surface?

A) Painting
B) Sanding
C) Filling
D) Clearing

2. Approximately, how much volume of air is needed in a spray booth?

A) 10,000 m^3
B) 20,000 m^3
C) 25,000 m^3
D) 30,000 m^3

3. What is necessary for painting of plastic surface?

A) Solvent
B) Water
C) Adhesion primer
D) Filling primer

➢ **After reading each sentence, put T (true) or F (false) in the blank.**

4. ( ) The air drawn in from outside must be filtered and warmed

5. ( ) The air speed should be too high in order to the paint applied dry too quickly on the surface.

6. ( ) The adhesion primer is used for a paint of plastic surface.

EVALUATION

Please compare the answers with the answer key. If you have wrong answers, you need to review the Learning Activity. If you give right answers to all questions, pass to the next learning activity

LEARNING ACTIVITY-5

AIM

You will use the technical English about automotive paint surface filling.

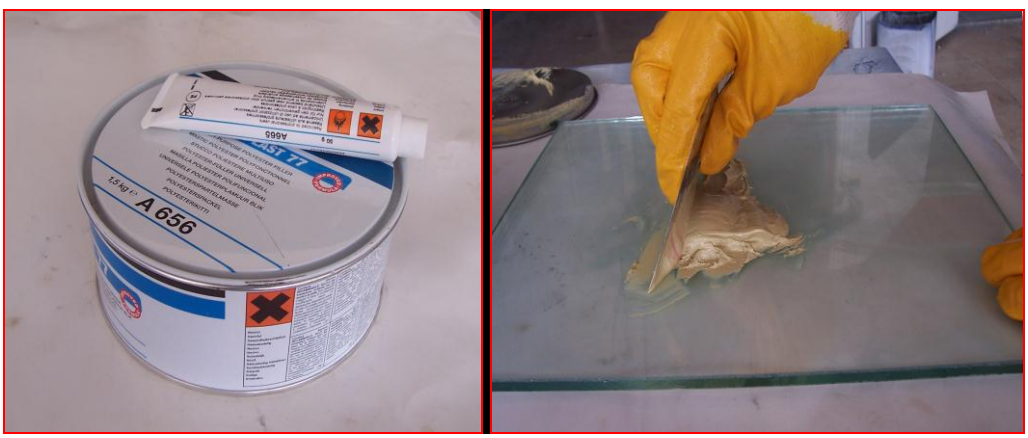
SEARCH

- Examine the company catalogs in English prepared and research the subject in detail on the internet.

5. AUTOMOTIVE PAINT SURFACE FILLING

5.1. Filling Paste Practices

Filling paste and hardener must be mixed before using. In order to achieve a perfect adhesion with the polyester body filler, the substrate must be degreased thoroughly using two clean cloths and degreaser. The joint between the old and the new panel can be made invisible using polyester body filler. Look at the picture 5.1 to see the filling paste and hardener mixture.

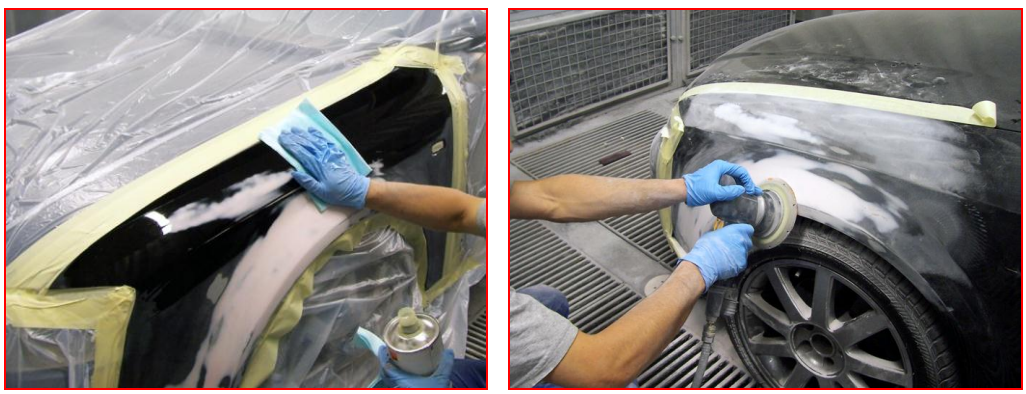


Picture 5.1: Filling paste and hardener and mixing both of them

Look at the picture 5.2 to see the filling paste practices.

Picture 5.2: Filling paste practices

After drying the polyester body filler must be sanded preferably using dry sanding paper. The original shape can be restored easily by help of a sanding block. Before the spray filler is applied, both the old paint and the black primer on the new panel must be sanded which can be done manually or with an orbital sanding machine. While the new panels and repaired ones are being sprayed in the filler, the car must be covered to protect against overspray. Look at the picture 5.3 to see the sanding and cleaning the surface after filling paste practices.



Picture 5.3: Sanding and cleaning the surface after filling paste practices

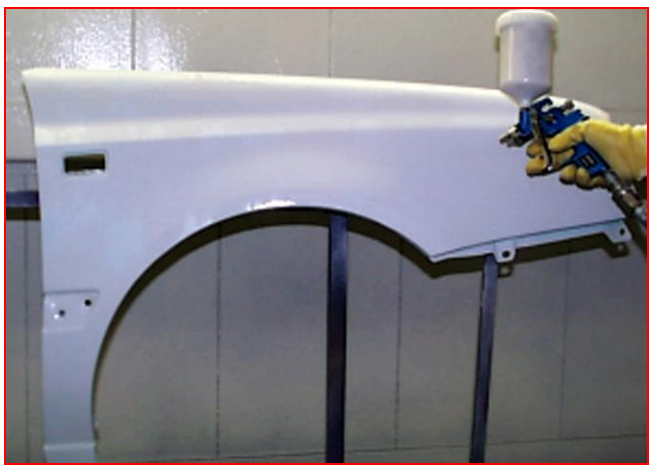
5.2. Filling Undercoat Practices

Prior to the application of each paint product, the substrate must be thoroughly degreased. Well protected against inhaling of paint fumes and vapours, the sprayer can now apply the filler. Once the filler is dry and hardened trough, it must be sanded with either wet or dry sanding paper, manually or with an orbital sanding machine. During this step, the interior of the car is protected against sanding dust or the residue from sanding water. The

last dust particles are blown away with clean compressed air. (Primer filler have very good anti-corrosive properties, easy and quick sanding). Look at the picture 5.4 to see the filling undercoat practices.

Picture 5.4: Filling undercoat practices

Before application of the colour coat the panels must be treated again with degreaser to remove all contamination. Masking is necessary to avoid overspray from the whole of coat on other parts of the car. The colour accuracy of the repair paint must be checked against the original car colour. Forced drying at 60°C is possible to speed up the drying process. (Automotive must be dry in the paint oven at the end of the paint process). Look at the picture 5.5 to see the refinishing practice.



Picture 5.5: Painting (refinishing) practice

You must use mask when you make painting practice. Look at the picture 5.6 to see the paint masks.

Picture 5.6: Paint masks

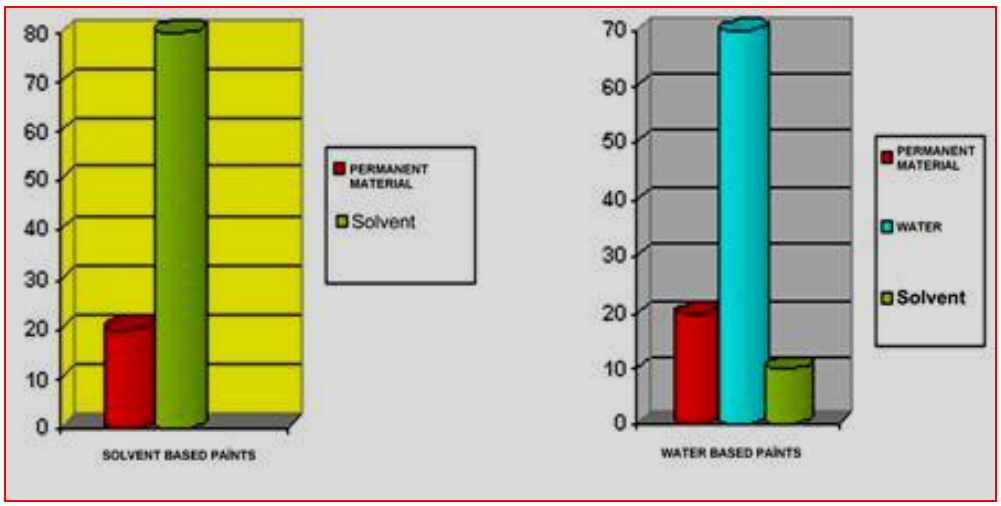
5.3. Automotive Painting

5.3.1. Solvent Based Paints

Solvent based paints are contents of high ratio solvent. Solvent damages human health and environment. However it is flammable and dangerous material. So, this paint is not used in Europe. But solvent based paints are faster dryable than water based paints.

5.3.2. Water Based Paints

Water based refinishing, which allows to achieve the same quality level as solvent based paint materials involves the use of appropriate water based products. The most important advantage of this environmentally acceptable process is that solvent consumption can be reduced by up to 80% compared to solvent-based refinishing systems. Look at the graphic to see the compare paint material.

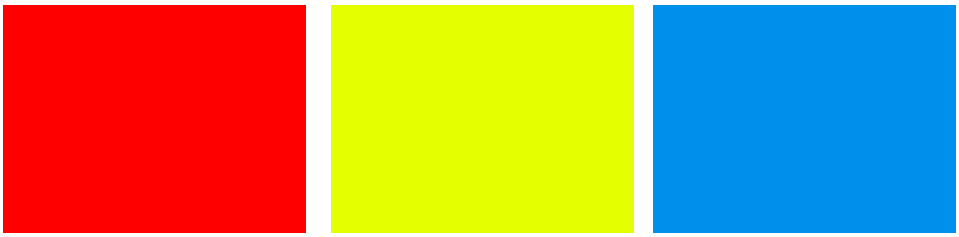


Graphic 1: Compare the solvent based paints and water based paints

5.3.3. Colour of Paints

The determination of the correct colour is one of the decisive process steps in automotive refinishing. Speed and precision are crucial factors as the human eyes are rather critical. A repair job is an expert repair job only if there is absolutely no difference between original finish and refinish. So the paint shops must use firms colour system and measuring device for precision. Look at down to see the variety of colours.

- **Main colours**



Red **Yellow** **Blue**

- **Distance colours**

Green **Orange** **Purple**

- **Neutral colours**

Black **Grey** **White**

5.4. Refinishing Practice

1.	The best place to have your damaged car repaired is a damage repair workshop also known as "body shop".
2.	An expert estimates the damage and the cost for repair. He also determines if the damaged panels can be repaired or needed to be replaced.
3.	The first step in the repair process is washing the car, this is essential to remove road dirt and other contamination.

4.	The next step is to remove all "lose" parts such as door locks, lights, bumpers and windows.
5.	In the panel beating section the damaged panel will be separated from the car body using a special sawing machine (or manually with a handsaw).
6.	After grinding or drilling all welding spots the panel can be removed (for safety reasons hands, eyes and ears must be well protected).

7.	The new panels are fitted to the car and placed in the correct position.
8.	With this action the panel will be precisely aligned with the adjacent body parts.
9.	The new panel is welded to the car body; the weld seam must be smoothened as much

	as possible with a disc grinder.

10.	To prepare for polyester body filler the feather edges of both the old paint and the black primer from the new panel must be sanded. This can be done manually or with an orbital sanding machine.
11.	In order to achieve a perfect adhesion with the polyester body filler the substrate must be degreased thoroughly using two clean cloths and degreaser.
12.	The joint between the old and the new panel can be made invisible using polyester body filler.

13.	After drying the polyester body filler must be sanded preferably using dry sanding paper. The original shape can be easily restored with help of a sanding block.
14.	The car is now transported to the preparation area where the next repair steps will take place.
15.	Before the spray filler can be applied both the old paint and the black primer on the new panel must be sanded which can be done manually or with an orbital sanding machine.

16.	When the new panels and repaired ones are being sprayed in the filler, the car must be covered to protect it against overspray.
17.	Prior to the application of each paint product the substrate must be thoroughly degreased.
18.	Well protected against inhaling of paint fumes and vapours the sprayer can now apply the filler.

19.	Directly after the filler a mist coat of a dark coloured paint can be applied. This is called guide coat and it is used to make the sanding results visible and to save a lot of time during the sanding process.
20.	Once the filler is dry and hardened trough, it must be sanded with either wet or dry sanding paper, manually or with an orbital sanding machine. During this step the interior of the car is protected against sanding dust or the residue from sanding water.
21.	The last dust particles are blown away with clean compressed air.

22.	Before application of the colour coat the panels must be treated again with degreaser to remove all contamination.
23.	Masking is necessary to avoid overspray from the colour coat on other parts of the car.
24.	The colour accuracy of the repair paint must be checked against the original car colour.

25.	In a spray booth with a good extraction and filtered fresh air the paint can be sprayed on the car.
26.	Forced drying at 60°C is possible to speed up the drying process.
27.	Specialized equipment such as paint spray guns must be thoroughly cleaned after use.

28.	When the paint is fully dry, all parts can be refitted to the car and rust proofing can be applied when necessary.
29.	The repair process ends with washing the car and the "finishing touch"
30.	The car can be delivered to a happy customer and nobody see that the car has been ever damaged!

APPLICATION ACTIVITY

Use technical English about automotive surface filling.

Steps of process	Suggestions
Find a text about this process and translate. Translate the text given below	➢ Please read all of the text. ➢ If you do not know words in text, research the meaning during translation ➢ Use English dictionary for the meaning of words from English to Turkish ➢ You can find detailed information about the technical words in the text. ➢ Make research about automotive surface filling

In recent years, more and more plastic has been used in various parts of car bodies, particularly in the front end: in bumper and fender extensions, in soft front fascia, fender aprons, grille opening panels, stone shields, instrument panels, trim panels, and elsewhere. Because these parts are much lighter in weight than sheet metal, they have become an important part of every American manufacturer's fuel saving, weight reduction program. And because of the high strength-to-weight ratio of plastic, the weight decrease does not mean a decrease in strength. Every indication is that plastic body parts are here to stay, and new applications for plastic will probably be found in the future. Therefore, automotive painters can expect to be painting a greater number of plastic parts.

Plastic body filler is the finishing touch to most sheet metal repairs. Restoring bent and stretched metal to its exact original shape and dimension would be very time consuming and almost impossible in many instances. But after the basic shape and soundness of the damaged panel has been restored (to within ¼ inch of its original contour) with proper metalworking techniques, the remaining minor blemishes can be quickly and easily masked with a thin coat of body filler. However, very careful attention must be given to preparation and application of plastic fillers. The permanence of the repair and the quality of the final finish is adversely affected by filler improperly mixed and applied. While most body repairs, including minor ones, are done by the body shop, the refinisher should have the knowledge of materials and the basic procedures.

From the customer's standpoint the topcoat or color coat is the most important operation in body repair because that is all the customer sees. The expert refinisher takes special pride in producing a beautiful finish on spot, panel repairs, or overalls that matches both the color (and color effect) and the texture of the original finish. Sometimes this color effect can be a basecoat / clear coat finish that more and more customers are viewing as a premium-looking finish. It is the painter's job to satisfy the customer with the paint application. So it is of great importance to fully understand all the working application instructions for applying topcoats. The best place for this is the paint label.

CHECKLIST

If you have behaviors listed below, evaluate yourself putting (X) in yes box for your earned skills within the scope of this activity otherwise put (X) in no box

Evaluation Criteria	Yes	No
1. Have you ever had the knowledge of the technical English with car paint surface preparation?		
2. Have you ever had the knowledge of the technical English with undercoat and paste practices on car paint?		
3. Have you ever had the knowledge of the technical English with paint practices on car?		
4. Have you ever had the knowledge of the technical English with repair and maintenance service practices on car?		
5. Did you make research on the subject?		

EVALUATION

Please review your "No" answers in the form at the end of evaluation. If you do not find enough yourself, repeat the learning activity. If you give all your answers "Yes" to all questions, pass to the "Measuring and Evaluation".

MEASURING AND EVALUATION

Read the sentences and answer the questions. Then compare your answers with the answer key at the end of the module.

1. What is the solvent based paint made of?

A) It is made of water based material
B) It is made of plastic material
C) It is made of solvent material
D) It is made of fiberglass material

2. Which one is not under coating component?

A) Primer
B) Paint
C) Filling paste
D) Primer filler

3. Which one is true for paint practice?

A) Sanding- clearing- filling paste- sanding and clearing- primer- painting
B) Sanding- clearing- primer- filling paste-painting
C) Sanding- clearing- primer- filling paste-painting- sanding and clearing
D) Sanding- clearing- filling paste-painting- sanding and clearing

After reading each sentence, put T (true) or F (false) in the blank.

4. ( ) There are three neutral colours.

5. ( ) The hardener mixes the filling paste.

6. ( ) The water based paint is harmful for environment.

EVALUATION

Please compare the answers with the answer key. If you have wrong answers, you need to review the Learning Activity. If you give right answers to all questions, pass to the module evaluation.

MODULE EVALUATION

Read the sentences and answer the questions. Then compare your answers with the answer key at the end of the module.

1. What are the automotive windows made of?
A) They are made of wood material
B) They are made of glass material
C) They are made of steel material
D) They are made of plastic material

2. How many doors are there on the sedan automotive?
A) There are three doors
B) There are four doors
C) There are two doors
D) There are six doors

3. What is the isolation component made of?
A) It is made of wood material
B) It is made of plastic material
C) It is made of steel material
D) It is made of fiberglass material

4. Which one has got a special isolation component?
A) The ceiling
B) The door
C) The engine unit
D) The glass

5. What is the automotive seat made of?
A) It's made of plastic and textile material
B) It's made of steel material
C) it's made of wood material
D) it's made of sheet iron material

6. Why is necessary foam in the automotive use?
A) For safety
B) For acoustic performance
C) For comfort
D) All

7. What are you preparing the spray paint with?
A) Pistol
B) Gun
C) Spatula
D) Sand

8. Which one is dangerous than the other material?
A) Water
B) Glass
C) Solvent
D) Air

9. What is a little water included based paints?
A) Water
B) Steel
C) Thinner
D) Solvent

10. How many main colours are there in nature?
A) There is one colour.
B) There are four colours.
C) There are three colours.
D) There are two colours.

After reading each sentence, put T (true) or F (false) in the blank.

11. ( ) The engine bonnet covers the engine unit.

12. ( ) There are two engine bonnets and baggage bonnets on the automotive body.

13. ( ) The engine bonnet is made of sheet iron.

14. ( ) A baggage unit carries spare wheel, jack, fuel depot and luggage.

15. ( ) The isolation component is necessary for comfort.

16. ( ) The safety belt is more important than the head support.

17. ( ) The sand paper is made of sand.

18. ( ) Pure polypropylene (pp) and polyethylene (pe) can be painted.

19. ( ) The primer is not effective for corrosion.

20. ( ) Automotive must be dried in the paint oven at the end of the paint process.

EVALUATION

Please compare the answers with the answer key. If you have wrong answers, you need to review the Learning Activity. If you give right answers to all questions, please contact your teacher and pass to the next module.

ANSWER KEYS

LEARNING ACTIVITY 1 ANSWER KEY

1	**C**
2	**B**
3	**D**
4	**True**
5	**False**
6	**False**

LEARNING ACTIVITY 2 ANSWER KEY

1	**D**
2	**C**
3	**A**
4	**False**
5	**True**
6	**False**

LEARNING ACTIVITY 3 ANSWER KEY

1	**C**
2	**D**
3	**B**
4	**False**
5	**True**
6	**True**

LEARNING ACTIVITY 4 ANSWER KEY

1	**D**
2	**B**
3	**C**
4	**True**
5	**False**
6	**True**

LEARNING ACTIVITY 5 ANSWER KEY

1	**C**
2	**B**
3	**A**
4	**True**
5	**True**
6	**False**

MODULE EVALUATION ANSWER KEY

1	**B**
2	**B**
3	**D**
4	**C**
5	**A**
6	**D**
7	**A**
8	**C**
9	**D**
10	**C**
11	**True**
12	**False**
13	**True**
14	**True**
15	**True**
16	**False**
17	**True**
18	**False**
19	**False**
20	**True**

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